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B. Rathbun

AMPHIPODA SYNOPIDEA

BY

Evik Alexander
CARL BOVALLIUS.

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Division of Crustacea

WITH 3 PLATES.

(PRESENTED TO THE ROYAL SOCIETY OF SCIENCES OF UPSALA THE 10th MAY 1886.)

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INVERTEBRATE
ZOOLOGY
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CONTENT.

| | |
|---|---------|
| Introduction | Pag. 1. |
| Amphipoda Synopidea | 2. |
| Diagram of the families | 3. |
| First family, Synopidæ | 3. |
| <i>Synopia</i> | 4. |
| Diagram of the species | 6. |
| <i>S. ultramarina</i> | 6. |
| <i>S. caraibica</i> | 14. |
| <i>S. Schélcana</i> | 16. |
| <i>S. gracilis</i> | 18. |
| <i>S. angustifrons</i> | 20. |
| <i>S. orientalis</i> | 21. |
| Second family, Trischizostomatidæ | 22. |
| <i>Trischizostoma</i> | 22. |
| <i>T. Raschii</i> | 24. |
| Third family, Hyperiopsidæ | 31. |
| <i>Hyperiosis</i> | 31. |
| <i>H. Voeringii</i> | 32. |
| Explanation of the plates | 34. |

Abbreviations.

| | | |
|-------------|---|---|
| <i>S.M.</i> | = | Collections of the Royal Swedish State Museum at Stockholm. |
| <i>D.M.</i> | = | » » the Zoological Museum of the University at Copenhagen. |
| <i>U.M.</i> | = | » » the Zoological Museum of the University at Upsala. |
| <i>N.M.</i> | = | » » the Zoological Museum of the University at Christiania. |
| <i>C.B.</i> | = | » » the author. |

My researches on the relations of the different forms of Amphipoda Hyperiidea to one another and to the other Amphipoda have induced me to establish a new tribe of Amphipoda, intermediate between the Gammaridea and the Hyperiidea. I propose to name it Amphipoda Synopidea. In my opinion the Amphipoda thus ought to be divided into five tribes, with the following diagnoses:

I. Amphipoda Tanaidea.

Caput cum segmento primo pereii coalitum.

Oculi minuti in lobis discretis siti, vel nulli.

Antennæ superiores flagello secundario instructæ vel destitutæ.

Pedes maxillares in unum coaliti, palpum quattuor-articulatum gerentes.

Laminæ branchiales pedibus maxillaribus affixæ.

Pleon sæpe quinque-articulatum.

Urus maximum.

Telson nullum.

II. Amphipoda Gammaridea.

Caput cum segmento primo pereii non coalitum.

Oculi mediocres, sessiles.

Antennæ superiores flagello secundario sæpissime instructæ.

Pedes maxillares non coaliti, palpum quattuor-articulatum gerentes.

Vesiculæ branchiales pedibus pereii affixæ.

Pleon tri-articulatum.

Urus mediocre, tri-articulatum.

Telson sæpissime fissum.

III. Amphipoda Synopidea.

Caput cum segmento primo pereii non coalitum.

Oculi grandes, maximam partem capitis occupantes, sessiles.

Antennæ superiores flagello secundario instructæ.

Pedes maxillares plus minusve coaliti, palpum quattuor-articulatum gerentes.

Vesiculæ branchiales pedibus pereii affixæ.

Pleon tri-articulatum.

Urus tri-articulatum.

Telson simplex vel leviter fissum.

IV. Amphipoda Hyperiidea.

Caput cum segmento primo pereii non coalitum.

Oculi sæpissime grandes, maximam partem capitis occupantes.

Antennæ superiores flagello secundo carentes.

Pedes maxillares in unum coaliti, palpo carentes.

Vesiculæ branchiales pedibus pereii affixæ.

Pleon tri-articulatum.

Urus bi- vel raro tri-articulatum.

Telson simplex non fissum.

V. Amphipoda Caprellidea.

Caput cum segmento primo pereii coalitum.

Oculi minuti.

Antennæ superiores flagello secundo carentes.

Pedes maxillares in unum coaliti, palpum unguiculatum gerentes.

Vesiculæ branchiales segmentis anticis pereii affixæ.

Pleon et *urus* valde reducta.

Telson nullum.

AMPHIPODA SYNOPIDEA.

Amphipods with the head free from the first pereional segment; with large eyes, occupying almost the whole surface of the head; the first pair of antennæ provided with a secondary flagellum; the maxillipeds more or less coalesced, provided with four-jointed palps; pleon and urus divided into three segments each; telson simple or partially cleft.

With the true Gammarids the animals belonging to this tribe have many characteristics in common, as the general form of the body, the secondary flagellum of the first pair of antennæ, the structure of the maxillipeds and their palps etc. (The first family, Synopidæ, is the most closely related to the Gammarids). Many characteristics point deci-

dedly to the Hyperids, as the structure and development of the eyes, the structure of the mouth-organs (with the exception of the palps of the maxillipeds), the form of the uropoda and the telson (especially in the last two families) a. o.

Probably the new genus *Hyperiopsis*, lately described by G. O. Sars¹⁾, is to be placed in this tribe as the type of a new family, Hyperiopsideæ, and I shall preliminarily do so here, although I do not know much about the very important characteristics of the mouth-organs, because Sars only mentions, that the mandibles are provided with palps, similar to those of the Gammarids.

Thus the tribe can conveniently be divided into three families:

1. SYNOPIDEÆ. 2. TRISCHIZOSTOMATIDÆ and 3. HYPERIOPSIDÆ.

| | | | |
|-------------------------------|---|-----------------------------|-----------------------------|
| The seventh pair of pereopoda | { | not transformed. Telson | bifid. Synopidæ. |
| | | | simple. Trischizostomatidæ. |
| | | transformed. Telson simple. | Hyperiopsideæ. |

The first family.

SYNOPIDEÆ.

Syn. **1852.** Subfamily *Synopinae*. DANA.

1862. Subfamily *Synopiades*. SPENCE BATE.

1880. Subfamily *Synopiadeæ*. R. KOSSMANN.

United States Exploring Expedition. Crustacea. vol. 2, p. 981. Fol. Catalogue of the specimens of Amphipodous Crustacea in the collection of the British Museum. p. 341.

Zoologische Ergebnisse einer im Auftrage der k. Academie der Wissenschaften zu Berlin ausgeführten Reise in die Küstengebiete des Rothen Meeres. Malacostraca. p. 137. Leipzig. 4to.

Diagn. The *head* is triangular, not tumid.

The *eyes* occupy the upper median part of the head, and are distinctly faceted.

The *mandibles* are well developed, with a three-jointed palp.

1) The Norwegian North Atlantic Expedition. Zoology. Crustacea. I, p. 231. Christiania. 1885. Fol.

The *maxillipeds*, coalesced at the base, carry strong four-jointed palps.

The *antennae* are fixed on the under-side of the head. The second pair are like those of the Gammarids.

The *seventh pair* of *pereiopoda* are not transformed.

The *uropoda* are like those of the Gammarids.

The *telson* is cleft to the middle.

The animals belonging to this family resemble the true Gammarids in more points than those of the two following families do and are very interesting as connecting links. Dana¹⁾ placed them among the Hyperids as the third subfamily of the family Hyperidæ; Spence Bate²⁾ removed them from this family and ranged them as the first subfamily of the family Oxycephalidæ. Claus mentions the genus 1871³⁾ as belonging to the Gammarids. KOSSMANN⁴⁾ regarded them as Hyperids and described some particulars of their morphology, overlooked by Dana. Other authors have totally omitted the animals, which seem to be very rare and easily passed over, being very small and, as is has been mentioned above, very similar in general habitus to Gammarids.

Genus 1. *Synopia*. DANA, 1852.

| | | | | | |
|------|-------|------------------|-------|--------------|---|
| Syn. | 1852. | <i>Synopia</i> . | DANA. | — | United States Exploring Expedition. Crustacea. vol. 2, p. 994. Folio. ~. |
| | 1862. | „ | „ | SPENCE BATE. | Catalogue of the specimens of Amphipodous Crustacea in the collection of the British Museum. p. 341. |
| | 1880. | „ | „ | R. KOSSMANN. | Zoologische Ergebnisse einer im Auftrage der k. Academie der Wissenschaften zu Berlin ausgeführten Reise in die Küstengebiete des Rothen Meeres. Malacostraca. p. 137. Leipzig. 4:to. |

1) United States Exploring Expedition. Crustacea. vol. 2, p. 981.

2) Catalogue of the specimens of Amphipodous Crustacea in the collection of the British Museum. p. 341.

3) »Untersuchungen über den Bau und die Verwandtschaft der Hyperiden«, in Nachrichten von der Königl. Gesellschaft der Wissenschaften und der G. A. Universität zu Göttingen, 1871, No 5. p. 157.

4) Zoologische Ergebnisse einer im Auftrage der königlichen Academie der Wissenschaften zu Berlin ausgeführten Reise in die Küstengebiete des Rothen Meeres. Malacostraca. p. 137.

Diagn. *Corpus* compressum, gracile.

Caput angustum, triangulatum.

Oculi grandes, in medio capitis confluentes, ocellis magnis.

Antennae primi paris flagello multi-articulato, articulo primo valde elongato, setoso.

Pedes pereii parium quattuor priorum inaequales, setosi; illi parium trium ultimorum elongati, subaequales, dactylis longis.

Pedes uri ultimi paris ramis externis bi-articulatis.

Telson maximum.

The *body* is compressed.

The *head* is narrow, triangular.

The *eyes* are very large, coalesced into one in the middle of the head, with distinct large ocelli.

The first pair of *antennae* with a multi-articulate flagellum; the first joint of the flagellum very long, beset with long hairs.

The first four pairs of *pereiopoda* are unequal, setose; the three last ones subequal, elongate, with long dactyli.

The last pair of *uropoda* with the outer rami bi-articulate.

The *telson* is very large.

The genus *Synopia* was established in the year 1852 by Dana upon specimens captured in the tropical seas during the United States Exploring Expedition 1838—1842. He distributed them into two or rather three species, *S. ultramarina*, *S. angustifrons* and *S. gracilis*, the last one only conditionally, supposing that it might perhaps prove to be the male of *S. ultramarina*. Judging from the descriptions and drawings of Dana, compared with the alcohol-specimens of *S. ultramarina* at my disposal, I think they are different species and shall retain the name proposed by Dana. SPENCE BATE cites the two species *S. ultramarina* and *S. angustifrons*, with short extracts from Dana's descriptions and copies of some of his figures. In the year 1880 R. KOSSMANN described some details of a *Synopia* from the Red Sea; he proposed for it the name *S. orientalis*. During the expedition of His Swed. Maj:s Corvette Balder, 1881—82, I captured four specimens of a new species and one of *S. ultramarina*, some twenty miles off the East coast of Barbadoes; and in the Caribbean Sea one specimen of another new species, closely allied to *S. ultramarina* and *S. gracilis*. Last year, in a very valuable collection of Hyperids and other pelagic Crustacea, made by Captain George von Schéele during a voyage round the world¹⁾ and presented to the Zoologi-

1) In the Swedish vessel *Monarch*, belonging to Consul Rettig of Gefle, who in the kindest manner supported the zoological labour of Captain von Schéele.

cal Museum of the University of Upsala, I found six specimens of *S. ultramarina* in comparatively good condition. These are the chief material for my researches on this species.

All the species of the genus *Synopia* are closely allied and seem rather to deserve the name of varieties than of species, of so small importance are the characteristics distinguishing them from one another; but as their differences seem to be constant, at least according to my experience, I am bound to describe them as distinct species.

| | | | | | |
|--------------------------------|---|--|---|---|------------------------------------|
| <i>Synopia.</i> The head is | <i>produced anteriorly.</i> The first pair of antennæ are | <i>shorter than the pereion.</i> Femora of the fifth and sixth pairs of pereiopoda | <i>rounded.</i> Flagellum of the first pair of antennæ with | <i>the first joint hairy, the following smooth.</i> | 1. <i>S. ultramarina.</i> Dana. |
| | | | | <i>all joints hairy.</i> | 2. <i>S. caraibica.</i> N. Sp. |
| | | | <i>more or less rectangular.</i> | 3. <i>S. angustifrons.</i> Dana. | |
| | <i>longer than the pereion.</i> Femora of the fifth and sixth pairs of pereiopoda | <i>rounded.</i> | 4. <i>S. Scheéleana.</i> N. Sp. | | |
| | | <i>truncate below.</i> | 5. <i>S. gracilis.</i> Dana. | | |
| | | <i>not produced anteriorly</i> | 6. <i>S. orientalis.</i> Kossmann. | | |

1. *Synopia ultramarina*. DANA, 1852.

Pl. I, fig. 1—21.

| | | | | | |
|------|-------|------------------------------|-------|--------------|---|
| Syn. | 1852. | <i>Synopia ultramarina</i> . | DANA. | — | United States Exploring Expedition. Crustacea. v. 2, p. 995. pl. 68, fig. 6 a—h. |
| | 1862. | „ | „ | SPENCE BATE. | Catalogue of the specimens of Amphipodous Crustacea of the British Museum, p. 341. pl. 54, fig. 1, 1 d, 1 h, 1 i. |

Diagn. *Caput* triangulare, longitudine latitudinem æquans.

Oculi parvi supplementarii singuli supra bases antennarum primi paris siti.

Antennæ primi paris quam pereion multo breviores. Flagellum secundarium longitudine articulum primum flagelli (veri) æquans vel superans.

Segmentum primum *perei* secundo longius, segmentum sextum septimo longius, omnium longissimum.

Femora parium quinti et sexti *pedum perei* rotundata, fere circularia. Pedes septimi paris illis sexti breviores.

Pedunculi *pedum plei* elliptici.

Segmentum primum *uri* secundo paulo longius.

Rami paris ultimi *pedum uri* longitudine inaequales, parte inferiore solum marginis interioris setis instructa.

Telson triangulare, apice truncato.

The *head* is triangular, as broad as long.

There is a small *secondary eye* on each side, at the bases of the first pair of antennæ.

The *first pair of antennæ* are much shorter than the pereion; the secondary flagellum as long as or longer than the first joint of the true flagellum.

The first segment of the *pereiopod* is longer than the second; the sixth is longer than the seventh, being the longest of all.

The femora of the fifth and sixth pairs of *pereiopoda* are rounded, nearly circular. The seventh pair are shorter than the sixth.

The peduncles of the *pleopoda* are elliptical.

The first *ural* segment is only a little longer than the second.

The rami of the last pair of *uropoda* are unequal in length, with the lower part only of the inner margin provided with hairs.

The *telson* is triangular, truncated at the hinder end.

There are some details in the drawings, given by Dana, which do not agree with mine, but I think it best to try to identify my specimens with the species of Dana, because in my opinion they agree in the more essential characteristics.

The *body* is strongly arched, with a thin hyaline integument, and agrees well in general habitus with the figure of Dana's *S. ultramarina*.

The *head* is triangular, seen from the side, even as from above, with two slight excavations for the insertion of the antennæ. It is smaller than in the following species, a little shorter than the first three pereional segments, not deeper than the pereion.

The *median eye* is round, composed of large ocelli, provided with distinct light-breaking elements. The number of peripheral ocelli is about twenty-four, not very distinct at the hinder margin. Over the bases of the first pair of antennæ there is on each side a little secondary

eye, detached from the head mass probably in an early period of the development; it is composed of three ocelli. The pigment is deep black.

The *first pair of antennæ* [Pl. I, fig. 2] are a little different in the male and the female; the peduncle is three-jointed, the first joint thick and long, the second scarcely as long as half the first, the third as long as half the second. The secondary flagellum consists of two joints, the first thick, five times longer than the second, beset with five to six bristles. In the male it is longer than the first joint of the true flagellum, in the female it equals the same joint in length. [Pl. I, fig. 3]. The true flagellum consists of a long, conical, a little tumid joint, like that of the genus *Hyperia*, carrying long hairs; then follow in the male nine, in the female four narrow joints, the terminal being the longest, with a long hair at the apex. In the male the first pair of antennæ reach to the anterior margin of the fifth segment, in the female scarcely to that of the fourth.

The *second pair of antennæ* [pl. I, fig. 2 a] are about twice longer than the first. The first joint of the peduncle is rounded, as long as broad, the second very short, the third linear, as long as the two preceding together, the fourth is the longest, with minute hairs along the anterior margin, the fifth as long as the third, with a long hair at the lower anterior corner and minute ones along the anterior margin. The flagellum consists in the male of 18, in the female of 12 articuli, in the male every one carries two minute hairs at the upper anterior corner. The flagellum is longer than the peduncle. The second pair of antennæ reach in the male to the first ural segment, in the female to half the second pleonal segment.

The mouth-organs are well developed, constructed for mastication.

The *labrum* [Pl. I, fig. 4] is divided into two semicircular projections, which are fringed with strong hairs, feebly curved at the ends.

The *mandibles* [Pl. I, fig. 5] are very strong; a little beyond the middle projects a thick, rounded, molar tubercle, whose grinding surface is provided with 10 curved, strongly denticulated crests [Pl. I, fig. 6]; at the outer side of the molar tubercle there is a bundle of denticulated spines and bristles. Then follows a deep excavation with a row of five long bifid spines [Pl. I, fig. 7]; the end of the mandible consists of a hollowed process, denticulated at the apex. From the middle of the outer margin of the mandible projects the three-jointed palp; the

first joint is very short; the second very long, tumid, irregularly ovate, carrying a single plumose hair near the outer end; the last joint is minute, scarcely a tenth of the length of the preceding, with two very long, plumose hairs at the tip. At the base of the mandibular palp there are two strong, denticulated, masticatory projections.

The *first pair of maxillæ* [Pl. I, fig. 8] consist of a short basal joint and two robust laminae; the outer one is the longest and broadest, carrying a row of nine to ten strong spines at the end, and another row of six spines a little behind, near the middle of the lamina. The inner lamina is fringed with long hairs along the inner margin, and carries a row of 7—8 unequal spines at the end.

The *second pair of maxillæ* [Pl. I, fig. 9] consist of two laminae; the inner is the larger, ovate, with a row of five peculiar, denticulated spines at the end [Pl. I, fig. 10], and a longitudinal row of 14—15 long, simple spines on the inner side of the lamina. The inner lamina is oblong, with about a dozen long bristles at the top.

The *maxillipeds* [Pl. I, fig. 11] are very large, when closed, totally covering the other oral organs. The basal joints are coalesced, the following free; both laminae are ovate, fringed with long, plumose hairs, the first along the inner, the second along the outer margin. The palp is four-jointed, the first joint is short and thick, the second three times longer than the first, fringed along the outer margin with long, plumose hairs. The third joint is narrower, half as long as the second, with long, simple hairs at the end; the fourth joint is very minute, about a fifth of the length of the preceding.

The *pereion*. The first segment is a little longer than the second, but shorter than the third, the third to fifth are equal, the sixth is much longer; longest of all, the seventh segment is longer than the fifth. The surface of the segments is very smooth, the posterior corners are feebly rounded.

The *epimerals* (Pl. I, fig. 1) are well developed, but very thin and totally pellucid; they are very easily overlooked, which may be the reason why they are not described by Dana, but only mentioned in the explanation of the plates and figured from the third segment together with the correspondent leg. (Dana l. c. p. 996, pl. 68, fig. 6, e). The epimerals of the first and second segments are as long as the segments, of an irregular shape and only half as deep as long. The epimerals of the third segment [Pl. I, fig. 13] are enormously developed; they are quadrangular with the upper corner (the articulation with

the segment) truncate, and the hinder margin excavate. At the inside of the upper corner is a tuberculous prominence, against which the upper end of the femur articulates; the epimeral is as deep as the length of the femur of the correspondent leg, quite as large as the femur of the fifth pair. The epimerals of the fourth segment are scarcely as long as the segment [Pl. I, fig. 14], deeper than long, the anterior margin rounded, the posterior straight; at the middle of the upper margin there is on the inside of the epimeral a tubercular projection for the articulation with the leg. The epimeral reaches as far down as half the length of its femur, and is partly concealed by the femur of the fifth pair of pereopoda. The epimerals of the fifth and sixth segments are longer than the segments, rounded at both ends, more than twice longer than deep; the posterior portion is a little deeper than the anterior. The last epimerals are shorter than the segment and smaller than the preceding, but of the same form. [Pl. I, fig. 17].

The *branchial sacks* are fixed at the bases of all the pereopoda with the exception of the first pair. Those of the second to fourth segments [Pl. I, fig. 14] are longer than the corresponding femora and very large, the following [Pl. I, fig. 15 and 16] equal the length of the femora and are more slender.

The *ovitectrices* [Pl. I, fig. 18] are attached to the bases of the second to sixth pairs of pereopoda; they are long, narrow laminae, a little broader at the lower ends, feebly bent inwards. They carry 8—12 long, simple hairs around the lower ends. They are a little shorter than the corresponding branchial sacks.

The *first pair of pereopoda* [Pl. I, fig. 12]. The *femur* is long and narrow, a little broader at the lower end, with two plumose hairs at the lower anterior corner; the *genu* is short, the *tibia* twice longer. The *carpus* is very large, dilated, nearly ovate, more than twice longer than the two preceding joints together and fully as long as the femur. It carries a single long hair at the lower anterior corner; the hinder margin is nearly semicircular, bordered with 14 plumose hairs, which are as long as half the breadth of the joint; at the lower posterior corner there is a long, plumose hair, longer than the metacarpus. The *metacarpus* is very dilated, with the anterior margin feebly, the posterior strongly curved; it is only a third longer than broad. The hinder margin is fringed with 14 plumose hairs and, at their bases some short, simple hairs. At the lower end of the joint around the dactylus

there are 3—4 long, simple hairs, longer than the dactylus. The *dactylus* is strong, feebly curved, only a little shorter than the metacarpus.

The *second pair*. The *femur* is long, narrow, smooth; the *genu* is very short, the *tibia* more than twice longer, smooth. The *carpus* is longer than the femur, more than five times longer than broad, the anterior margin straight, the posterior feebly curved and provided with very strong, plumose bristles; at the upper third of the joint these bristles are geniculate, six in number; at the lower part they are straight, very long, 8—10 in number. The *metacarpus* is longer than half the carpus, a little dilated, four times longer than broad. The anterior margin is nearly straight, the posterior irregularly curved, fringed with 10—12 strong, plumose bristles, longer than the breadth of the joint. At the lower end there are two long, simple hairs on each side of the dactylus, as long as the metacarpus itself. The *dactylus* is very small, shorter than a sixth of the length of the preceding joint, pedunculated; the peduncular part is a little longer than the claw.

The *third pair* [Pl. I, fig. 13]. The *femur* is as long as the epimeral is deep, broader at the posterior margin; the *genu* is short, the *tibia* very long and broad, laminar, with the hinder margin strongly curved, the anterior straight, smooth, with a single simple hair at each of the lower corners. The *carpus* is broad, ovate, laminar, the hinder margin fringed with 10—11 unequal, plumose hairs; it is longer than the tibia (16: 13). The tibia and carpus together equal the length of the femur. The *metacarpus* is narrow, nearly linear, shorter than the carpus (13: 17), the posterior margin with three simple hairs. The *dactylus* is a little longer than half the metacarpus, pedunculated; the peduncular part is elongate, lanceolate, more than twice as long as the claw, which is feebly curved, sharp.

The *fourth pair* [Pl. I, fig. 14]. The *femur* is elongate-elliptical, very narrow at the upper end, with a long, simple hair at the lower posterior corner. The *genu* is short, with a plumose hair at the posterior margin. The *tibia* very broad, laminar, triangular with rounded corners, broader than long (14: 9), with a plumose hair at the hinder margin and a long simple one at the anterior corner. The *carpus* is long and very broad, laminar, the anterior margin is straight, the under margin nearly straight, the hinder margin curved, and the upper margin excavated. It is scarcely a third longer than broad. Along the lower and hinder margins there is a row of 15 plumose hairs, the longest shorter than the breadth of the joint. The *metacarpus* is elongate-ovate, longer than half the carpus, with four

short, plumose hairs at the lower end. The *dactylus* is a little shorter than the metacarpus (8: 11), pedunculated, of the same shape as in the preceding pair.

The *fifth pair* [Pl. I, fig. 15]. The *femur* is rounded, nearly circular, a little longer than broad (13: 11), the hinder margin is quite smooth, the anterior carrying three short hairs. The *genu* is short, the *tibia* broad, three times longer than the *genu*, the hinder margin feebly curved, with a short spine at the lower corner, the anterior margin straight with 3—4 spines. The *carpus* equals the *tibia* in length, and is linear, with 4—5 spines at the anterior margin. The *metacarpus* is longer and narrower, linear, with two pairs of spines on the anterior, and a simple hair at the posterior margin; at each of the lower corners there is a long, straight spine. The *dactylus* is very long, nearly straight, sharp-pointed, not pedunculated, only a little shorter than the metacarpus (19: 23).

The *sixth pair* [Pl. I, fig. 16] are longer than the fifth but of the same structure. The *femur* is longer than broad (29: 23), and carries a spine at the lower anterior corner. The *metacarpus* is quite as long as the *femur*, with four pairs of spines along the anterior margin, the last pair at the lower corner, two short spines at the hinder margin, and a longer one at the lower hinder corner. The *dactylus* is only a little shorter than the metacarpus [11: 14], straight, sharp.

The *seventh pair* [Pl. I, fig. 17] are about a fifth shorter than the sixth; the *femur* is broad, laminar, posteriorly produced downwards, the projection reaching nearly to the middle of the *tibia*; the hinder margin is curved, smooth; the anterior margin is feebly curved, nearly straight. The *genu* is short; the *tibia* of the same form as in the two preceding pairs, but carrying only two spines at the lower corners. The *carpus* is of the length of the *tibia*, with three or four spines along the anterior margin and two on the posterior. The *metacarpus* is longer and narrower, but not equalling the *femur* in length; it carries four single spines along the anterior margin and one on the posterior. At the lower, hinder corner there are two straight spines. The *dactylus* is straight, long, sharp, but does not fully equal two thirds of the length of the metacarpus (15: 24).

The *pleon*. The segments are large, equal in length, each as long as the sixth pereionial segment. The flanks of the segments reach tolerably deep, the under margin is rounded; they end posteriorly in a not very sharp angle. The *pleon* equals the first five pereionial segments together in length.

The *pleopoda* [Pl. I, fig. 19]. The peduncles are elliptical, longer than the flagella; the number of articuli in the outer flagellum of the first pair is 10, in the inner flagellum 9. The cilia of the flagella are pedunculated, long, plumose; the peduncular part long, but shorter than the rest [Pl. I, fig. 20].

The *urus* [Pl. I, fig. 21]. The first segment is only a little longer than the second (5: 4); the last is nearly as long as the second. The *urus* is as long as the first three pereopod segments. The surface is quite smooth.

The *first pair of uropoda*. The peduncle is linear, reaching to the posterior margin of the last urol segment. The rami are unequal, the inner much the longest, both ending with a strong movable claw-like spine. The outer ramus is shorter than the peduncle, finely serrated along the inner margin. The inner ramus is longer than the peduncle, the inner margin smooth, carrying only one short spine at the middle and two very small at the lower corner, at the base of the great claw-like spine.

The *second pair*. The peduncle does not reach to the posterior margin of the last segment; the rami are unequal in length, the inner the longest, both ending with short, feebly curved spines, two in each. Both rami are smooth on the outer margins and finely serrated along the inner.

The *third pair*. The peduncle is very short, broader below; the rami are unequal in length, the outer the longest. The outer ramus is two-jointed, the terminal joint equals a third of the length of the basal joint. The outer margins of both rami are smooth, the lower parts of the inner margins carry four simple hairs in the outer ramus, three in the inner one; at the lower end of the terminal joint of the outer ramus there are two minute spines. The lower end of the inner ramus carries also two minute spines and between them two long, strong hairs.

The *telson* is very large, triangular, obliquely truncated behind, divided beyond the middle by a longitudinal fissure. At the lower ends there are some minute spines. The telson is longer than the peduncle of the last pair of uropoda, almost as long as the last two urol segments together.

Colour. Ultramarine (Dana), hyaline.

Length. 5—6 m.m.

Hab. The tropical parts of the Atlantic. (S.M. U.M. CB.)

2. *Synopia caraibica*. N. sp.

(Pl. II, fig. 30.)

Diagn. *Caput* triangulare, longitudine latitudinem superans.

Oculi parvi supplementarii, singuli, supra bases antennarum primi paris siti.

Antennæ primi paris quam pereion multo breviores, flagello valde setoso.

Flagellum secundarium longitudine articulum primum flagelli (veri) superans.

Segmentum primum *perci* secundum longitudine æquans, sextum et septimum æqualia.

Femora parium quinti, sexti et septimi *pedum perci* elongato-ovata. Pedes quinti paris longissimi, sequentes longitudine decrecentes.

Pedunculi *pedum plei* ovati.

Segmentum primum *uri* secundo duplo longius.

Telson ovatum, leviter fissum.

The *head* is triangular, longer than broad.

A small secondary *eye* on each side of the head, at the base of the first pair of antennæ.

The *first pair of antennæ* are much shorter than the pereion, the flagellum is richly provided with hairs along its whole length. The secondary flagellum is longer than the first joint of the true flagellum.

The first segment of the *pereion* equals the second in length; the sixth is as long as the seventh.

The femora of the fifth, sixth, and seventh pairs of *perciopoda* are elongate-ovate, almost pear-shaped. The fifth pair are the longest, the following decreasing.

The peduncles of the *pleopoda* are egg-shaped.

The first segment of the *urus* is twice as long as the second.

The *telson* is ovate, only a little bifid.

The only specimen of this animal that I got was very damaged, being taken from the stomach of an *Exocoetus*. It seems to be closely allied to *S. ultramarina*, but is distinguished from it by comparatively good characteristics, as the setose flagellum of the first pair of antennæ, the form of the femora of the last three pairs of *perciopoda*, especially of the last, and the form of the telson.

The *body* is arched, but not as much as in *S. ultramarina*.

The *head* is proportionally much larger than in the preceding species, more obtuse; the excavation for the insertion of the first pair

of antennæ is much deeper. The head is fully as long as the first four pereional segments.

The large median *eye* is surrounded by 20 ocelli in an unbroken circle. The secondary eyes are separated from the median one by a longer distance than in the other species.

The first joint of the *first pair of antennæ* is almost globular, the second narrow, linear, scarcely half as long as the first, the third a little longer. The flagellum consists of five joints, the first much the longest, all richly provided with long hairs. The secondary flagellum is two-jointed.

The second pair of antennæ were broken off.

The *pereion*. The first four segments are equal, the last three a little longer, equal.

The *epimerals* of the first and second segments are deeper than long; the following could not be examined.

The *pereiopoda*, as far as it could be ascertained, are very similar to those of *S. ultramarina*, differing only in the form of the femora of the last three pairs, and in the length of the fifth pair.

The *pleon*. The first segment is a little longer than the second, the pleon is exactly as long as the pereion.

The *pleopoda*. The peduncles are shorter than the flagella.

The *urus* is as long as the first four pereional segments. The last segment is longer than the second.

The first pair of *uropoda* reach almost to the apex of the last pair.

The *telson* is a little longer than the peduncle of the last pair of uropoda, equalling the last ural segment in length. The fissure is scarcely a third of the length of the telson.

Colour. White, with a few red spots at the lower ends of the pereional segments.

Length. 5 m.m.

Hab. The Caribbean Sea. [S. M.]

One specimen in the stomach of a small *Exocoetus*, off the coast of Venezuela at the Long. of the Island of Margarita.

3. *Synopia Schéeleana*. N. sp.

(Pl. II, fig. 22—29.)

Deriv. The name in honor of Captain George von Schéele, the zealous collector of pelagic animals for the University of Upsala.

Diagn. *Caput* triangulare, longitudine latitudinem æquans.

Oculi parvi supplementarii, singuli, supra bases antennarum primi paris siti.

Antennæ primi paris quam pereion longiores; flagellum secundarium longitudine articulum primum flagelli (veri) haud æquans.

Segmentum primum *perei* secundum longitudine æquans; sextum septimo brevius, septimum omnium longissimum.

Femora paris quinti *pedum perei* ovata, femora paris sexti circularia.

Pedunculi *pedum plei* cylindrici.

Segmentum primum *uri* secundo ter longius.

Rami ultimi paris *pedum uri* inæquales, margine toto interno setis instructo.

Telson latum, ovatum, in apice rotundatum.

The *head* is triangular, as broad as long.

A small secondary *eye* on each side of the head, at the base of the first pair of antennæ.

The *first pair of antennæ* are longer than the pereion; the secondary flagellum shorter than the first joint of the true flagellum.

The first *pereional* segment is as long as the second; the sixth is shorter than the seventh, which is the longest.

The femora of the fifth pair of *pereiopoda* are ovate, those of the sixth pair circular.

The peduncles of the *pleopoda* are cylindrical.

The first *ural* segment is three times longer than the second.

The rami of the last pair of *uropoda* are unequal in length, fringed with hairs along the whole length of the inner margins.

The *telson* is broad, ovate, rounded at the ends.

Synopia Schéeleana is intermediate between *S. ultramarina* and *S. gracilis*, but is perhaps more allied to the last. It differs from it in the following characteristics: the supplementary eyes, the short secondary flagellum of the first pair of antennæ, the circular form of the femur of the sixth pair of pereiopoda, the length of the same pair in comparison with the seventh; the equal length of the rami of the last pair of uropoda. The differences from *S. ultramarina* will be mentioned below.

The *body* is not very arched, almost straight.

The *head* is triangular seen from above, but nearly rectangular seen from the side, a little shorter than the first four pereional segments. The excavation for the insertion of the antennæ is very large, deeper than half the depth of the head.

The median *eye* is very broad, not circular; the number of peripheral ocelli is about thirty, those of the hinder margin are indistinct. The small secondary eyes are situated very close to the median eye.

The *first pair of antennæ* [Pl. II, fig. 23] reach quite to the anterior margin of the second pleonal segment. The last joint of the peduncle is scarcely as long as a third of the second. The flagellum consists of 16 joints, the first much the longest, as long as the four following ones together, beset with long hairs; the following are totally smooth, except the last, which carries a long terminal hair. The secondary flagellum is two-jointed, shorter than the first joint of the true flagellum.

The *second pair of antennæ* [Pl. II, fig. 24] are similar in structure to those of *S. ultramarina*, but the articuli of the flagellum are longer and more setose.

The *pereion*. The fifth and sixth segments are equal, the seventh the longest, as long as the first two together.

The *epimerals* [Pl. II, fig. 22] resemble very closely those of *S. ultramarina*.

The *first pair of pereiopoda* [Pl. II, fig. 25] differ from the same pair in *S. ultramarina* only in very unimportant details, as the carpus being proportionally longer, the plumose hairs also longer, as long as the breadth of the joint, and the dactylus shorter, equalling only two thirds of the length of the metacarpus.

The *second pair* [Pl. II, fig. 26] are of the same form as in *S. ultramarina*, the bristles of the carpus and metacarpus are a little longer and stronger.

The *third pair* [Pl. II, fig. 27]. The femur is shorter than the epimeral is deep. The tibia is longer than the carpus; the tibia and carpus together are longer than the femur. The anterior margin of the tibia is fringed with minute hairs.

The *fourth pair* [Pl. II, fig. 28]. The carpus is almost twice as long as broad; both tibia and carpus are filled with a glandular mass, a little of which is to be seen also in the metacarpus. The metacarpus is half as long as the carpus, the hinder margin fringed with 10—12 very long, plumose hairs, longer than the joint itself.

The *fifth to seventh pairs* are like those of *S. ultramarina*, differing only in the form of the femora of the fifth and sixth pairs.

The *pleon* is longer than the pereion.

The peduncles of the *pleopoda* are cylindrical, shorter than the flagella.

The *urus*. The first segment is three times longer than the second, the third is almost twice longer than the same.

The *first pair of uropoda* [Pl. II, fig. 29]. The outer ramus is finely ciliated along the inner margin, with a minute spine in the middle.

The *second pair*. The peduncle reaches beyond the posterior margin of the last segment. The outer ramus is totally smooth along both margins; the inner ramus finely ciliated, with two short spines along the inner margin.

The *third pair*. The rami are unequal in length, the outer the longest, two-jointed; the outer margins of both rami are smooth, the inner fringed with hairs along their whole length.

The *telson* is a little longer than the last ural segment, broadly ovate, bifid, with rounded ends, the fissure scarcely equalling half the length of the telson.

Colour. Hyaline.

Length. 4—6 m.m.

Hab. The tropical parts of the Atlantic (U.M. S.M.). Some twenty miles East off Barbadoes (D.M., C.B.).

4. *Synopia gracilis*. DANA, 1852.

(Pl. II, fig. 31—35, copied from Dana).

Syn. 1852. *Synopia gracilis*. DANA. United States Exploring Expedition. Crustacea. vol. 2, p. 998, pl. 68, fig. 7 a—c. Fol.

Diagn. *Caput* triangulare, longitudine latitudinem æquans.

Oculi supplementarii desunt.

Antennæ primi paris quam pereion multo longiores; flagellum secundarium longitudine articulum primum flagelli (veri) æquans.

Segmentum primum *perei* secundo brevius, segmentum sextum et septimum æqualia.

Femora parium quinti et sexti *pedum perei* non rotundata, infra truncata.

Pedes septimi paris pedibus sexti paris longitudine æquales.

Pedunculi pedum plei in apice truncati.

Segmentum primum uris secundo plus quam duplo longius.

Rami ultimi paris pedum uris longitudine aequales.

Telson obsoletum.

The *head* is triangular, as broad as long.

Secondary *eyes* are wanting.

The *first pair of antennæ* are much longer than the pereion; the secondary flagellum equals the length of the first joint of the true flagellum.

The first *pereiopod* segment is shorter than the second; the sixth is as long as the seventh.

The femora of the fifth and sixth pairs of *pereiopoda* are not rounded, but truncated below. The seventh pair equal the length of the sixth.

The peduncles of the *pleopoda* are truncated below.

The first *ural* segment is more than twice longer than the second.

The rami of the last pair of *uropoda* are equal in length.

Telson obsolete.

Dana proposed the above quoted name for the animal, but he thought that it might possibly prove to be the male of *S. ultramarina*. As I have got males among the specimens, which I have identified with Dana's *S. ultramarina*, I must retain the name of Dana, allowing that the animals are closely allied.

»The body is more slender than in *S. ultramarina*, and has no convexity along the back.»

»The excavation in the lower part of the head, from which the antennæ proceed is very large, being as broad as the part of the head immediately above.»

»The superior antennæ are sparingly shorter than the body; flagellum of the inferior pair scabrous.»

Colour. »More or less entirely ultramarine.» »The blue colour was deepest along the venter. The four anterior legs and the bases of the superior antennæ had the same rich blue colour.»

Length. 6 m.m.

Hab. The Atlantic: »Lat. 8°—12° S. and Long. 11°—14° 15' W.; also Lat. 4°—7° S. and Long. 21°—25° W.»

5. *Synopia angustifrons*. DANA, 1852.

(Pl. II, fig. 36—39, copied from Dana).

| | | | | | |
|------|-------|-------------------------------|-------|---|--|
| Syn. | 1852. | <i>Synopia angustifrons</i> . | DANA. | — | United States Exploring Expedition. Crustacea. vol. 2, p. 998, pl. 68, fig. 8 a—d. Fol. |
| | 1862. | „ | „ | „ | SPENCE BATE. Catalogue of the specimens of Amphipodous Crustacea in of the collection of the British Museum. p. 342, pl. 54, fig. 2. |

Diagn. *Caput* angustum, triangulare, longius quam latius.

Oculi supplementarii desunt.

Antennæ primi paris quam pereion multo breviores; flagellum secundarium longitudine articulum primum flagelli (veri) superans.

Segmentum primum *perei* secundo brevius, segmentum sextum et septimum æqualia.

Femora paris quinti *pedum perei* angusta, rectangularia, femora paris sexti duplo latiora, infra truncata; pedes septimi paris pedibus sexti breviores.

Pedunculi *pedum plei* infra lati, truncati.

Segmentum primum *uri* secundo paulo longius.

The *head* is narrow, triangular, longer than broad.

Secondary *eyes* are wanting.

The *first pair of antennæ* are much shorter than the pereion; the secondary flagellum is longer than the first joint of the true flagellum.

The first *pereional* segment is shorter than the second; the sixth is as long as the seventh.

The femora of the fifth pair of *pereiopoda* are narrow, rectangular, those of the sixth pair twice as broad, truncated below; the seventh pair are shorter than the sixth.

The peduncles of the *pleopoda* are broad at the lower ends, truncate.

The first *ural* segment is only a little longer than the second.

The sides of the *head* »converging forward at an angle of 40°—50°».

»The number of ocelli is between 40 and 50.»

The *first pair of antennæ* [Pl. II, fig. 38] reach to the anterior margin of the fifth pereional segment, the true »flagellum is five-jointed», the secondary flagellum »three-jointed».

The *second pair of antennæ* reach beyond the anterior margin of the last pleonal segment. »The flagellum is ten-jointed, joints slender, cylindric».

The *second pair of pereopoda* [Pl. II, fig. 39] are »slender, the joints cylindrical».

The femur of the *seventh pair* »is similar to that of *S. ultramarina*».

Colour. »Intense blue, with a barely perceptible tinge of red.»

Length. 4 m.m.

Hab. The Pacific »Lat. 18° S. and Long. 122° W.»

6. *Synopia orientalis*. R. KOSSMANN, 1880.

Syn. 1880. *Synopia orientalis*. R. KOSSMANN. Zool. Ergebnisse c. im Auftr. der K. Acad. der Wiss. zu Berlin ausgef. Reise in die Küstengebiete des Rothen Meeres. vol. 2, p. 137, pl. 15, fig. 11—13. Fol.

The *head* is not produced anteriorly over the bases of the antennæ, vertically truncated.

The median *eye* is large occupying the whole length of the head.

Both pairs of *antennæ* are longer than the body. The first joint of the flagellum of the first pair is very long. The secondary flagellum is three-(?)jointed. The second pair of antennæ are longer than the first.

The tibia and carpus of the third pair of *pereopoda* are stronger and stouter than those of *S. ultramarina*. The dactylus is pedunculated. The tibia of the fourth pair is shorter than half the carpus. The dactylus is long, not pedunculated.

»The other characters agree with those of *Synopia ultramarina*, Dana.»

Length. 3 m.m.

Hab. The Red Sea.

The second Family.

TRISCHIZOSTOMATIDÆ. G. O. SARS.

| | | | | |
|------|-------|----------------------------|----------------|--|
| Syn. | 1860. | <i>Prostomata.</i> | A. BOECK. | Forhandl. ved de Skandinaviske Naturforskere 8:de Möde. p. 637. |
| | 1865. | <i>Trischizostomatina.</i> | W. LILLJEBORG. | »Bidrag till kännedomen om underfamiljen Lysianissina inom underordningen Amphipoda bland kräftdjuren». p. 9. in Upsala Universitets Årsskrift 1865. Matematik och Naturvetenskap. |
| | .. | .. | .. | »On the Lysianassa magellanica», etc. p. 17, in Nova Acta Reg. Soc. Sc. Upsaliensis. Ser. III, vol. VI. |
| | 1870. | <i>Prostomata.</i> | A. BOECK. | »Crustacea amphipoda borealia et arctica». p. 10. in Christ. Vidensk. Selsk. Forhandlinger for 1870. |
| | 1872. | .. | .. | De skandinaviske og arktiske Amphipoder. p. 95. 4:to. |
| | 1882. | <i>Trischizostomidae.</i> | G. O. SARS. | »Oversigt af Norges Crustaceer», etc. I. in Christ. Vidensk. Selsk. Forhandlinger 1882, N:o 18. p. 20. |

Diagn. The *head* triangular, not tumid.

The *eyes* large, occupying the sides of the head, distinctly faceted.

The *mandibles* styliform, with a strong three-jointed palp.

The *maxillipeds* coalesced along the middle, forming a gouge-like operculum for the mouth-organs, carrying a four-jointed palp.

The *antennæ* are fixed on the under-side of the head. The second pair of antennæ like those of the Gammarids.

The seventh pair of *pereiopoda* not transformed.

The *uropoda* like those of the Hyperids.

The *telson* simple.

Only one genus *Trischizostoma*, A. BOECK. The young ones of *Trischizostoma Raschii* show an interesting feature pointing to their relationship with the preceding family, in the exterior ramus of the last pair of uropoda being bi-articulate and the telson cleft or rather incised to less than a fifth of its length. These characteristics are totally changed in the adult animal. In the large epimerals of the second to fourth pereional segments the animals belonging to this family show another resemblance to the Synopidæ, a feature which reappears in the family Hyperipsidæ, but in a lower degree.

Gen. 1. **Trischizostoma.** A. BOECK, 1860.

| | | | | |
|------------|------------------------|----------------|----------|---|
| Syn. 1860. | <i>Trischizostoma.</i> | A. BOECK. | — | Forhandlinger ved de Skand. Naturforskere 8:de Møde. p. 637. |
| 1865. | „ | W. LILLJEBORG. | „ | »Bidrag till kännedomen om underfamiljen Lysianassina inom underordningen Amphipoda bland kräftdjuren». p. 9, in Upsala Universitets Årsskrift, 1865. Matematik och Naturvetenskap. |
| „ | „ | „ | „ | »On the Lysianassa magellanica», etc. p. 17, in Nova Acta Reg. Soc. Sc. Upsaliensis, Ser. III, vol. VI. |
| 1870. | „ | „ | A. BOECK | »Crustacea borealia et arctica». p. 10. in Christ. Videnskabs Selsk. Forhandlinger for 1870. |
| 1872. | „ | „ | — | De Skandinaviske og Arktiske Amphipoder. p. 96. 4:to. |

Diagn. *Corpus* latum, non compressum.

Caput latum, triangulatum, ante in rostrum latum, crassum, in apice rotundatum, productum.

Oculi grandes, in medio capitis non confluentes, ocellis magnis.

Antennæ primi paris flagello multi-articulato instructæ, articulum primum flagelli crassum, elongatum.

Pedes pereii primi paris metacarpo permagno, inflato, semicirculari; dactylo in angulo inferiore posteriore affixo. *Pedes pereii* quarti paris tibia elongata, valde dilatata. *Pedes trium parium ultimorum* dactylis modicis, robustis.

Pedes uri ultimi paris ramis lanceolatis, integris.

Telson magnum.

The *body* is broad, not very compressed.

The *head* is broad, triangular anteriorly produced into a broad, thick rostrum, rounded at the tip.

The *eyes* are large, not coalesced in the middle of the head, with distinct large ocelli.

The first pair of *antennæ* with a multi-articulate flagellum, the first joint of the flagellum thick and long.

The first pair of *pereiopoda* have a very large, tumid, semicircular metacarpus, the dactylus is articulated against the hinder lower corner of the metacarpus. The fourth pair with the tibia very broad and long. The last three pairs with robust, but not very long dactyli.

The last pair of *uropoda* with the exterior rami lanceolate, not bi-articulate.

The *telson* is large.

Only one species is hitherto known.

Trischizostoma Raschii. A. BOECK, 1860.

| | | | | |
|------|-------|--------------------------------|-----------|--|
| Syn. | 1860. | <i>Trischizostoma Raschii.</i> | A. BOECK. | Forhandl. ved de Skandinaviske Naturforskere 8:de Møde. p. 637. |
| | 1870. | „ | „ | »Crustacea amphipoda borealia et arctica». p. 11. in Christ. Vidensk. Selsk. Forhandling for 1870. |
| | 1872. | „ | „ | De skandinaviske og arktiske Amphipoder. p. 97. 4:to. |

Diagn. *Caput* cum rostro segmento primo pereii brevius.

Antennæ primi paris flagello decem-articulato, articulo primo sequentibus longitudine æquante. Flagellum secundarium tri-articulatum.

Genu paris secundi *pedum pereii* perlongum, longitudine carpi superans; dactylo minimo. Tibia paris quarti longitudinem femoris æquans.

Epimera segmentorum secundi, tertii et quarti permagna, epimerum segmenti secundi maximum, triangulatum.

Pedes uri secundi paris apicem ultimi paris attingentes.

Telson rotundatum, pedunculo *pedum uri* ultimi paris longius.

The *head* with the rostrum shorter than the first pereional segment.

The flagellum of the first pair of *antennæ* ten-jointed, the first joint as long as the following together. The secondary flagellum is three-jointed.

The genu of the second pair of *pereiopoda* is very long, longer than the carpus; the dactylus is very small. The tibia of the fourth pair equals the length of the femur.

The *epimerals* of the second, third, and fourth segments are very large, that of the second segment is the largest, triangular.

The second pair of *uropoda* reach to the end of the third pair.

The *telson* is rounded, longer than the peduncle of the last pair of *uropoda*.

The description of Boeck is not quite accurate; it seems that he has taken some characteristics from the adult animal and others from very young ones; the drawings given by him do not always agree with his description; on this account it seems convenient to give here also figures of some details of a younger specimen for comparison with the same organs in the adult animal. The specimens described here were taken by me at »Tjøttö», Northern Norway, from a depth of 80 fathoms July 1871, and in »Hardanger fjord» south-western coast of Norway, July 1880.

The *habitus* of the animal resembles a *Lysianassa*, the dorsal side of the body being broad and even, without keel; the surface of the body is smooth and hard as if polished.

The adult female.

The *head* is much deeper than the pereion, broad, smooth; the rostrum is very broad at the base, slightly tapering towards the end, the apex broadly rounded. The head with the rostrum is as long as deep, and a little shorter than the first pereional segment. The insertion for the antennæ on the under-side of the head, at the base of the rostrum, pointing to the case of the *Oxycephalidæ*.

The *eyes* occupy almost the whole sides of the head, separated from one another only by a very narrow strip of the front; they consist each of large ocelli, ranged in 18 longitudinal rows, 9 in the uppermost row and 3 in the undermost one, in all about 100 ocelli in each eye.

The *first pair of antennæ* [Pl. III, fig. 42] are a third longer than the head. The first joint of the peduncle is very thick and long, the second very short, the third twice as long as the second. The flagellum is 10-jointed; the first joint is as thick at the base as the last peduncular joint, and is almost as long as all the following joints together (13: 15), smooth, tapering anteriorly. The two following joints are short, equal, a little narrower than the apex of the first joint; the last seven joints are shorter and narrower, tapering towards the end, without hairs or bristles. The secondary flagellum is three-jointed, almost as long as the first joint of the ordinary flagellum; its first joint is very long and thick, the two terminal very minute, carrying some minute hairs.

The *second pair of antennæ* [Pl. III, fig. 43] are much longer than the first pair, reaching, if bent backwards, beyond the anterior margin of the fourth pereional segment. The first joint of the peduncle is stout and thick, projecting downwards into a short, round process, forming the opening of a cavity in the joint; I suppose that the organ can be interpreted either as an auditory cavity, as the lower, circular surface of the process seems to be closed by a thin membrane, or as a secretory gland. The dissection of the organ gives more probability to the latter supposition, because the process is filled with a granular mass and only a few very minute hairs are to be seen at the bottom of the joint. The second and third joints are very short, but broad; the fourth is the longest, broader than the fifth, carrying a single

plumose hair at the lower hinder corner. The fifth joint carries some minute hairs along the anterior margin, and at the lower end. The flagellum is a third longer than the peduncle, the first joint is the longest, about half as long as the last joint of the peduncle, the following are short, tapering towards the end.

The *mouth-organs* are transformed into a projecting tube, forming a powerful boring and sucking instrument.

The *labrum* [Pl. III, fig. 44] forms a long, triangular, open channel, bifid at the lower end, with sharp, tooth-shaped points, excavated at the base to afford place for the mandibular palps.

The *mandibles* [Pl. III, fig. 45] consist of a broad, strong basal portion, projecting into a long, single, sharp-pointed, styliform process; at the base of the process it carries a large, stout palp; the first joint of the palp is very short but broad; the second very long, elongate-ovate, with an oblique row of long, simple hairs from the middle to the upper end; the third joint is a little shorter than the second, bordered by long hairs along the inner margin.

The *first pair of maxillæ* [Pl. III, fig. 46] have the outer lamina reduced, the inner elongate, with four strong teeth at the apex.

The *second pair of maxillæ* [Pl. III, fig. 47] with both laminae elongate, narrow, carrying minute teeth at the ends.

The *maxillipeds* [Pl. III, fig. 48] are coalesced into a gouge-like channel, forming together with the labrum the walls of the tube; the two first joints of the right maxilliped are coalesced with the corresponding joints of the left one, the inner laminae are very narrow, concealed by the outer, which are large, hollowed, placed close to one another. The palp is four-jointed, as usual, the first joint short, the second, twice longer, equalling the third, the fourth is the longest. The second and third carry long hairs at the exterior ends.

The *pereion*. The first segment is long, the longest of all, equaling the last two ones together in length, the second to fifth segments are equal, the hinder corners feebly rounded. At the dorsal side of the sixth and seventh segments there is a slight ovate excavation. The surface is hard and smooth, white as ivory. The segments are a little convex longitudinally, distinctly separated from one another; the first is somewhat higher than the others.

The *epimerals* [Pl. III, fig. 41] are well developed, that of the first segment is long but not very deep, triangular, partly concealed by the following, which is enormous in size, triangular, with the upper

corner truncated, as long as the first two pereional segments. The epimeral of the third segment is as long as the segment, but twice as deep, rounded at the anterior margin, straight at the hinder. That of the fourth segment is fully as long as the segment, the anterior margin rounded, the inferior straight, the lower hinder corner truncate, and the hinder margin deeply excavated. The epimeral of the fifth segment is longer than the segment and longer than deep, with obtusely rounded corners. The epimerals of the sixth and seventh segments are smaller, not so deep as the preceding, scarcely longer than the corresponding segments, with feebly rounded corners.

The *branchial sacks* are very large, thin, showing very broad white crests or bands crossing each other at acute angles. They are fixed at the bases of the second to seventh pairs of pereiopoda.

The *ovitetrices* [Pl. III, fig. 49] are shorter than the branchial sacks, lanceolate, four on each side.

The *first pair of pereiopoda* [Pl. III, fig. 50] are enormously developed, and characterize the animal at once. The *femur* is long and narrow, slightly bent at both ends; the *genu* is tolerably long and stout; the *tibia* is shorter; the *carpus* a little longer, but transformed, and turned round backwards, pressed against the metacarpus with the whole length of the joint, thus turning round the metacarpus so that the original anterior corner seems to be the posterior. The *metacarpus* is globularly inflated, bordered by sharp, recurved teeth along the under margin, against which the dactylus impinges; the anterior corner is provided with five tooth-shaped tubercles and two movable, strong bristles. The *dactylus* articulates against the *apparently hinder* corner of the metacarpus, it is quite as long as the underside of the metacarpus, feebly curved, without teeth or serrations. The hand thus forms a most powerful instrument for holding fast the animal to the body of its host, the animal probably living as ecto-parasite on sharks, and other larger fishes, principally from greater depths.

The *second pair* [Pl. III, fig. 51]. The *femur* is long, smooth, broader at the lower end; the *genu* is of an unusual length, a little shorter than the femur and longer than the carpus; the *tibia* equals half the length of the femur; the *carpus* is longer, richly beset with hairs; the *metacarpus* is short, broadly triangular, surrounded with hairs. The very small *dactylus* is articulated at the middle of the lower margin of the underside of the metacarpus, not as usual at the anterior corner. The part of the margin, against which the dactylus impinges, is denticulated,

with rounded, minute teeth, and provided with stout, straight bristles of another kind than those bordering the rest of the metacarpus [Pl. III, fig. 52].

The *third pair* [Pl. III, fig. 53]. The *femur* is tolerably broad; the *genu* short; the *tibia* very long, broad, with some short spines at the hinder lower corner. The *carpus* is ovate, short, scarcely half as long as the femur. The *metacarpus* is long, as long as the tibia, narrow, finely serrated along the hinder margin. The *dactylus* equals a third of the length of the metacarpus; it is not very curved, finely serrated along the hinder margin.

The *fourth pair* [Pl. III, fig. 54]. The *femur* is longer than broad, smooth; the *genu* is short; the *tibia* is long and unusually broad, broader than half its length (9: 15), with some minute spines along the hinder margin, pointing to the state in *Hyperlopsis*; the tibia equals the length of the femur. The *carpus* is ovate, half as long as the tibia. The *metacarpus* and *dactylus* are similar to those of the preceding pair, the *dactylus* only a little longer [Pl. III, fig. 55].

The *fifth pair* [Pl. III, fig. 56]. The *femur* is broad, laminar, the hinder part deeply produced downwards, the hinder margin straight; the *genu* small; the *tibia* broad, provided with minute spines along the anterior and posterior margins; the *carpus* is only a little shorter than the tibia, serrated at the anterior margin, with two small spines. The *metacarpus* is as long as the carpus; the *dactylus* longer than half the metacarpus, both serrated along the anterior margins.

The *sixth pair* [Pl. III, fig. 57]. The *femur* is broad, laminar, the hinder part not so deeply produced as in the preceding pair; the anterior and posterior margins rounded; at the lower anterior corner there are some strong bristles. The *tibia* is narrower than in the preceding pair, with the same armature. The *carpus* is as long as the tibia; the *metacarpus* a little shorter; the *dactylus* half as long as the preceding joint; all three joints serrated along the anterior margins.

The *seventh pair* [Pl. III, fig. 58] are a little longer than the fifth and sixth pairs; the *femur* has the anterior margin straight; the following joints are similar to those of the sixth pair.

The *pleon*. The segments are large, subequal, tolerably deep; the flanks of the segments are rounded, with a slight angulation inferiorly. The pleon is as long as the first four segments of the pereion; the surface is smooth and hard as in the pereion.

The *pleopoda* [Pl. III, fig. 59] consist of a thick peduncle and two long, articulated flagella, bordered with long, plumose hairs. The

flagella are longer than the peduncles. The flagellum of the first pair consists 17 joints.

The *urus* [Pl. III, fig. 60] is shorter than the first two pereional segments, and also shorter than the first two pleonal segments. At the dorsal side of the first segments there is a deep excavation for the reception of the hinder margin of the last pleonal segment, when the body is stretched out. The second and third segments are free, not coalesced, the third longer than the second.

The *first pair of uropoda* reach to the ends of the peduncles of the last pair; the rami are longer than the peduncle; the outer ramus is slightly serrated along the outer margin; the inner ramus smooth, a little longer; both broadly lanceolate.

The *second pair* reach as far as the third pair; the rami are narrower and more pointed than in the preceding pair, smooth, a little longer than the peduncle.

The *third pair* are nearly as long as the two last ural segments, the rami are more than twice longer than the peduncle, lanceolate, smooth.

The *telson* is almost circular, longer than the peduncle of the last pair, with the margins smooth.

Length 22 m.m.

The young male.

(Pl. III, fig. 61—67).

The specimens examined were probably just out from the incubatory pouch of the mother; they present some interesting differences, which will be shortly mentioned below. Some of these characteristics point decidedly to the family Synopidæ.

The *head* is longer than the first pereional segment.

The *eyes* are distinctly faceted, but without the brown pigment.

The *first pair of antennæ* [Pl. III, fig. 62] are nearly twice as long as the head, the flagellum four-jointed, the secondary flagellum two-jointed.

The *second pair of antennæ* [Pl. III, fig. 63] have only four joints in the flagellum, the first joint very long.

The *mouth-organs* are very similar to those of the adult animal, but the palp of the mandibles wants hairs, and the teeth at the ends of the maxillæ are but feebly developed, the laminæ and the palp of

the maxillipeds are not ciliated, quite smooth; the inner laminae are more distinct than in the adult animal.

The *pereion*. The first segment is shorter than the sixth and seventh together. The surface of the pereion shows the insertion of the muscles, and is a little granular.

The *epimerals* [Pl. III, fig. 61] are smaller than in the adult animal.

The *first pair of pereopoda* [Pl. III, fig. 64] are proportionally larger, and the carpus not transformed as in the adult animal; the metacarpus with the anterior angle directed forwards as usual, and thus the dactylus articulating in its ordinary place; the lower margin of the metacarpus shows only a few very minute teeth; the dactylus is shorter than the lower margin of the metacarpus.

The *second pair* [Pl. III, fig. 65]. The genu is shorter than half the femur; the metacarpus is nearly ovate, and the dactylus proportionally longer.

The *third and fourth pairs* [Pl. III, fig. 66] have the tibia shorter and not so much dilated as in the adult animal.

The *fifth, sixth, and seventh pairs* have the femora very narrow and the following joints smooth, not serrated.

The *pleon* is longer than the first four pereional segments.

The *pleopoda* carry pointed flagella; the peduncles are very long.

The *urus* [Pl. III, fig. 67] is as long as the first two pereional segments, and nearly as long as the first two pleonal ones. The excavation at the dorsal side of the first segment is very distinct; the first segment is as long as the two following together. The third segment is only a little longer than the second.

The *first pair of uropoda* with the rami narrower, without serrations; at the lower end of the outer ramus there is a small notch, indicating an earlier division or articulation of the ramus. The same occurs in the second pair.

The *third pair* do not reach beyond the tips of the second pair; the rami are scarcely twice longer than the peduncle. The outer ramus consists of two joints, as in *Synopia*, the terminal joint equals a third of the length of the basal joint. The inner ramus is undivided, smooth.

The *telson* is broad, not rounded, deeply excavated, nearly bifid at the middle of the posterior margin.

Length. 5 m.m.

Colour. White as ivory; the eyes dark brown.

Hab. The Arctic Sea, the North Atlantic. The animal was found for the first time at »Havbroen», a bank, 150—300 fathoms deep, some twenty miles off the west coast of Norway, by Professor RASCH, of the Christiania University; later at »Thronthiemsfjord», more to the north on the same coast, by Conservator Storm. This specimen was parasite on a shark. In the year 1880 I found some specimens in »Hardangerfjord», at a depth of 250 fathoms, parasites on, or in company with, an *Asterias*. Some years before I had got about twenty young specimens at »Tjöttö», on the west coast of Norway, some twenty miles south of the polar circle. A very young one was also taken by A. BOECK in »Christianiafjord», the south coast of Norway, at a depth of 60 fathoms. I am also informed that some specimens of the animal were captured at the west coast of Novaja-Zemlja by Captain Collin. (S.M., U.M., D.M., N.M., CB.).

The third family.

HYPERIOPSIDÆ.

Diagn. The *head* large, globular, tumid.

The *eyes* large, filling the sides of the head.

The *mandibles* with a three-jointed palp.

The *maxillipeds*?

The first pair of *antennæ* are fixed at the lower anterior corner of the head; the second pair are fixed on the under-side of the head; they are few-jointed, not angulated.

The seventh pair of *pereiopoda* transformed.

The two first pairs of *uropoda* are two-jointed, not bi-ramous, the last pair bi-ramous. The *telson* is simple, very minute.

Genus 1. **Hyperiopsis.** G. O. SARS, 1885.

Syn. 1885. *Hyperiopsis*. G. O. SARS. The Norwegian North Atlantic Expedition 1876—1878. Zoology. Crustacea, I, p. 231. Fol.

Diagn. *Carpus* latus.

Caput globulare, tumidum.

Oculi grandes, imperfecti.

Antennæ primi paris flagello multi-articulato, articulo primo valde elongato, setoso.

Pedes pereii primi et secundi paris simplices non subcheliformes, pedes tertii et quarti paris tibiis elongatis lamellatis, instructi; pedes pereii paris ultimi transformati, filiformes.

Pedes uri ultimi paris ramis lanceolatis.

Telson minimum.

The *body* is very broad.

The *head* is globular, tumid.

The *eyes* are large, but imperfectly developed.

The first pair of *antennæ* with a multi-articulate flagellum; the first joint of the flagellum very long, beset with long hairs.

The two first pairs of *pereiopoda* are simple, not subcheliform; the two succeeding pairs with the tibia very long, lamelliform; the last pair transformed, filiform.

The last pair of *uropoda* with lanceolate rami.

The *telson* is minute.

Only one species is known.

1. *Hyperiopsis Voeringii*. G. O. SARS, 1885.

(Pl. II, fig. 40, copied from G. O. Sars.)

Syn. 1885. *Hyperiopsis Voeringii*. G. O. SARS. The Norwegian North Atlantic Expedition 1876—1878. Zoology. Crustacea, I, p. 231. Fol.

Diagn. *Corpus* læve.

Caput margine anteriore arcuato, tuberculo parvo supra bases antennarum primi paris instructo.

Antennæ primi paris flagello XII—XIII-articulato, articulo primo sequentibus brevior. Flagellum secundarium quattuor-articulatum.

Tibiæ parium tertii et quarti *pedum perei* valde elongatæ, dilatatæ, remiformes.

Epimera segmentorum quattuor priorum magna, subæqualia.

Rami paris ultimi *pedum uri* pedunculo longitudine æquales.

The *body* is smooth.

The *head* with the anterior margin evenly arched, with a slight tubercular projection over the base of the first pair of *antennæ*.

The first pair of *antennæ* with a 12—13-articulated flagellum; the first joint shorter than the following together. The secondary flagellum is four-jointed.

The *tibiæ* of the third and fourth pairs of *pereiopoda* are very elongate, dilated, oar-shaped.

The *epimerals* of the first four pereional segments are large, subequal.

The rami of the last pair of *uropoda* equal the length of the peduncle.

As I have not got any specimen at my disposal for examination, the above quoted characteristics are extracted from the description of Professor Sars (l. c.); for further particulars I refer to his detailed description, mentioning here only some few important facts.

The *eyes* are without any trace of refractive elements or distinctly developed pigment.

The secondary flagellum of the *first pair of antennæ* is about as long as the first joint of the true flagellum; its first joint is the longest.

The *second pair of antennæ* are shorter and more slender than the first, the flagellum is shorter than the peduncle.

The femora of the last three pairs of *pereiopoda* are slender, not lamelliform; the following part of the last pair is very elongate.

The first two pairs of *uropoda* are long, slender, two-articulate. This is a very peculiar form of uropoda, not occurring, as far as I know, in the tribe of Amphipoda Hyperiidea.

Length. 11 m.m.

Hab. The North Atlantic.

»One example of this remarkable Amphipod was taken, on the first cruise of the Expedition, off the Norwegian coast (Stat. 54)¹⁾ at a depth of 600 fathoms. Another (defective) specimen was subsequently extracted from the stomach of the remarkable deep-sea fish, *Rhodichthys regina*, COLLETT, brought up at Stat. 297²⁾, from a depth of 1280 fathoms.» (G. O. Sars l. c. p. 233).

1) About Lat. 64°54' North and Long. 3°50' East from Greenwich.

2) About Lat. 71°50' North and Long. 5°30' East from Greenwich.



EXPLANATION OF THE PLATES.

Pl. I.

Synopia ultramarina. Dana.

- Fig. 1. The animal seen from the side. ♀. (¹⁶/₁).
 2. One of the first pair of antennæ. ♂. (³²/₁).
 2 a. » » » second pair of antennæ. ♂. (³²/₁).
 3. The secondary flagellum of the first pair of antennæ. ♂. (⁹⁶/₁).
 4. A piece of the labrum. ♀. (⁹⁶/₁).
 5. The right mandible. (⁹⁶/₁).
 6. A piece of the surface of the molar tubercle of the mandible. (³⁸⁰/₁).
 7. A bifid spine from the excavation of the mandible. (²⁸⁰/₁).
 8. The right one of the first pair of maxillæ. (⁹⁶/₁).
 9. The left one of the second pair of maxillæ. (⁹⁶/₁).
 10. A spine from the same. (²²⁰/₁).
 11. The left maxilliped. (⁹⁶/₁).
 12. One of the first pair of pereopoda. (⁴⁸/₁).
 13. » » » third » » » (⁴⁸/₁).
 14. » » » fourth » » » (⁴⁸/₁).
 15. » » » fifth » » » (⁴⁸/₁).
 16. » » » sixth » » » (⁴⁸/₁).
 17. » » » seventh » » » (⁴⁸/₁).
 18. An ovitectrix from the fifth segment. (⁴⁸/₁).
 19. One of the first pair of pleopoda. (⁴⁸/₁).
 20. A hair from the preceding. (²⁵⁰/₁).
 21. The urus. (⁴⁸/₁).

Pl. II.

Synopia Schœlcana. N. sp. ♂.

- Fig. 22. The animal seen from the side. (¹⁶/₁).
 23. One of the first pair of antennæ. (³²/₁).
 24. » » » second » » » (³²/₁).
 25. » » » first » » » pereopoda. (⁴⁸/₁).

- Fig. 26. One of the second pair of pereopoda. ($^{18}/_1$).
 > 27. » » » third » » » ($^{18}/_1$).
 » 28. » » » fourth » » » ($^{18}/_1$).
 » 29. The urus. ($^{18}/_1$).

Synopia caraibica. N. sp. ♂.

- Fig. 30. The head of the animal from the side. ($^{16}/_1$).

Synopia gracilis. Dana.

- Fig. 31. The animal seen from the side. }
 > 32. The head from above. }
 » 33. One of the first pair of antennæ. } copied from Dana.
 » 34. » » » » » » uropoda. }
 » 35. The last pair of » }

Synopia angustifrons. Dana.

- Fig. 36. The animal seen from the side. }
 > 37. The head from above. }
 > 38. One of the first pair of antennæ. } copied from Dana.
 » 39. » » » second » » preiopoda. }

Hyperopsis Voeringii. G. O. Sars.

- Fig. 40. The animal seen from the side (copied from G. O. Sars).

Pl. III.

Trischixostoma Raschii. A. Boeck.

The adult female.

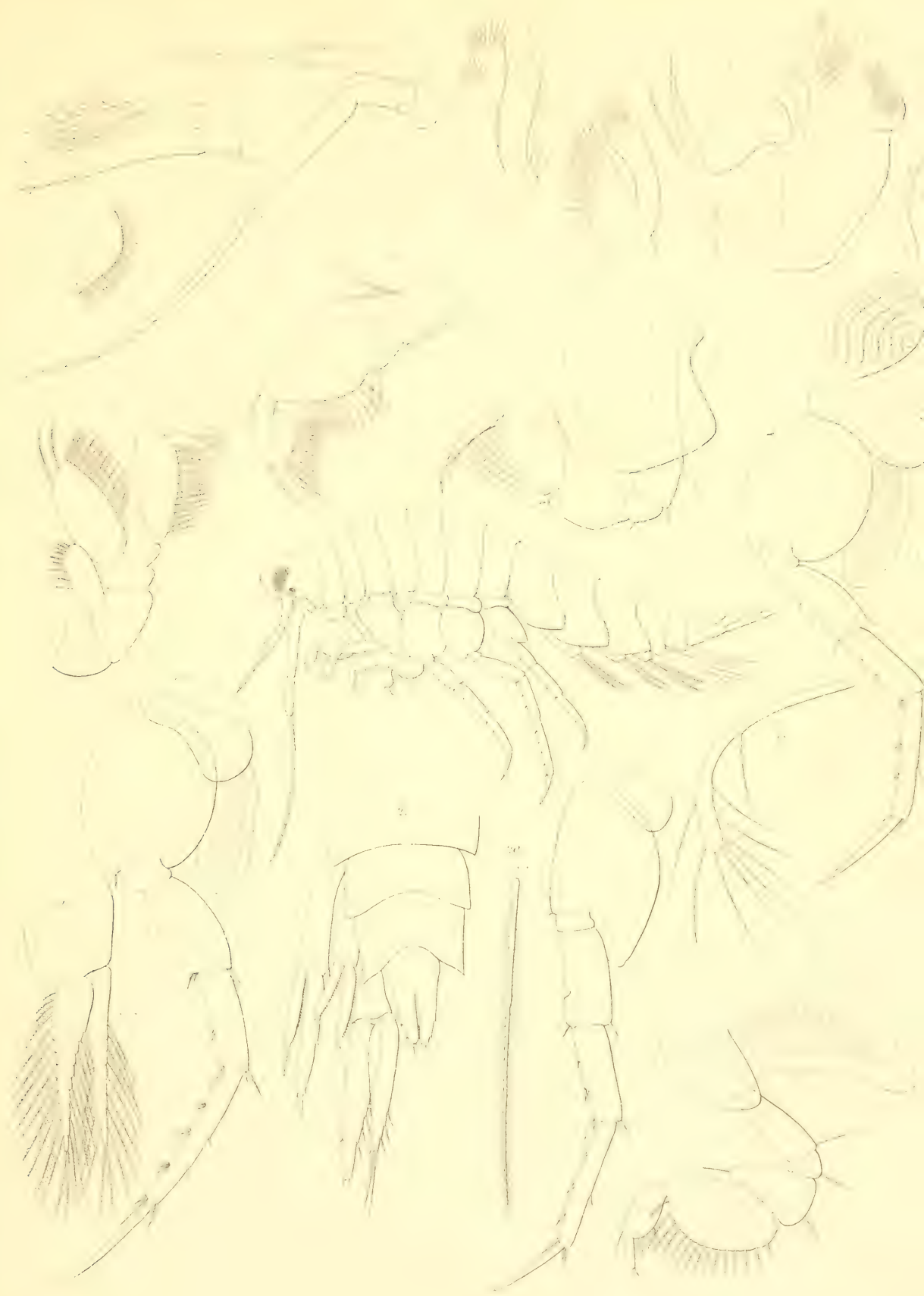
- Fig. 41. The animal seen from the side. ($^4/_1$).
 » 42. One of the first pair of antennæ. ($^{12}/_1$).
 43. » » » second » » » ($^{12}/_1$).
 » 44. The labrum. ($^{32}/_1$).
 » 45. The left mandible. ($^{32}/_1$).
 » 46. One of the first pair of maxillæ. ($^{32}/_1$).
 » 47. » » » second » » » ($^{32}/_1$).
 » 48. The maxillipeds. ($^{32}/_1$).
 » 49. An ovitectrix from the fourth segment. ($^{12}/_1$).
 : 50. One of the first pair of pereopoda. ($^{12}/_1$).
 » 51. » » » second » » » ($^{12}/_1$).
 : 52. The dactylus of the preceding. ($^{35}/_1$).
 » 53. One of the third pair of pereopoda. ($^{12}/_1$).

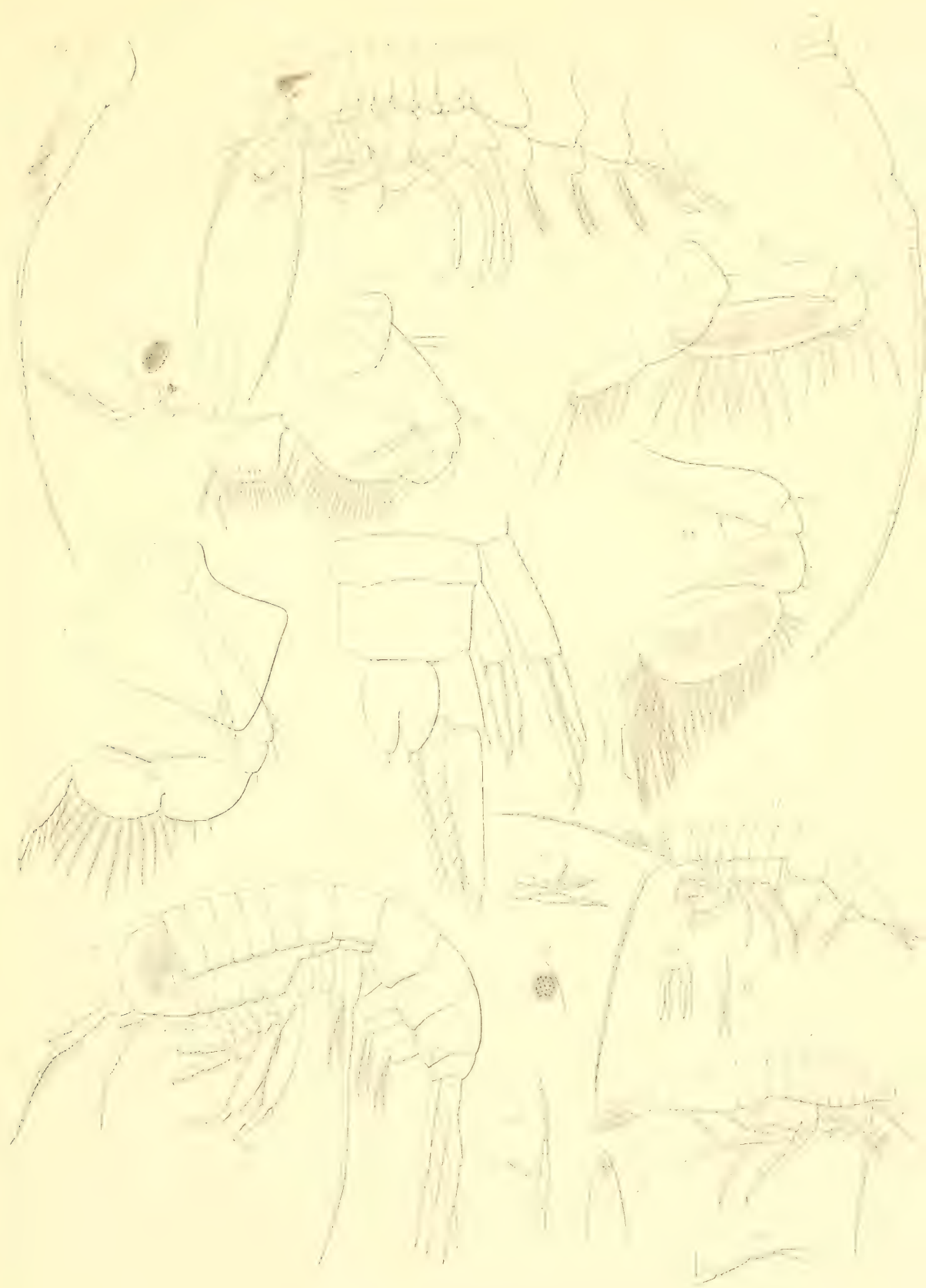
- Fig. 54. One of the fourth pair of pereopoda. ($^{12}/_1$).
 55. The last joints of the preceding. ($^{35}/_1$).
 56. One of the fifth pair of pereopoda. ($^{12}/_1$).
 57. » » » sixth » » » ($^{12}/_1$).
 58. » » » seventh » » » ($^{12}/_1$).
 59. » » » first » » pleopoda. ($^{15}/_1$).
 60. The urus. ($^8/_1$).

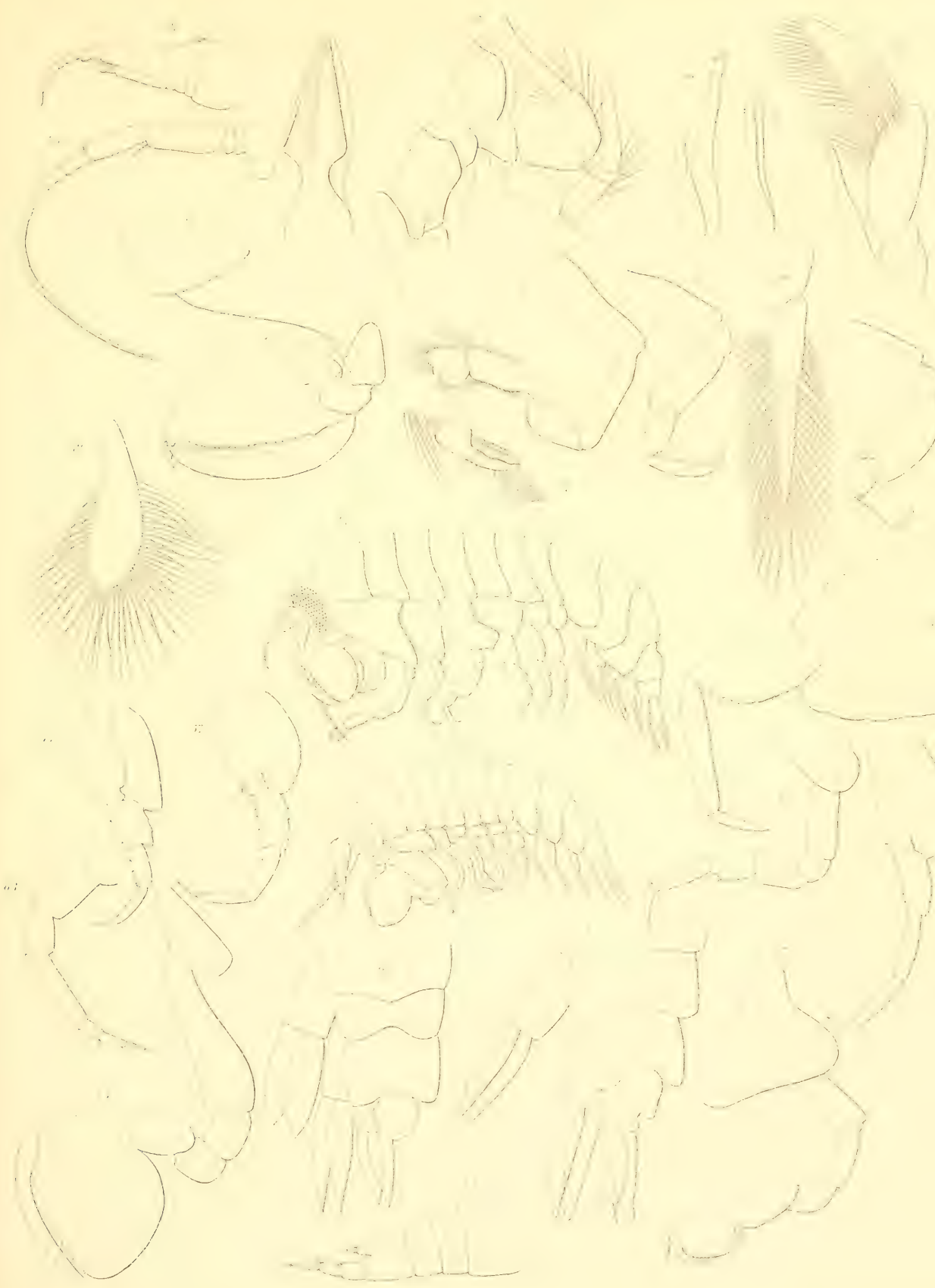
The Young male.

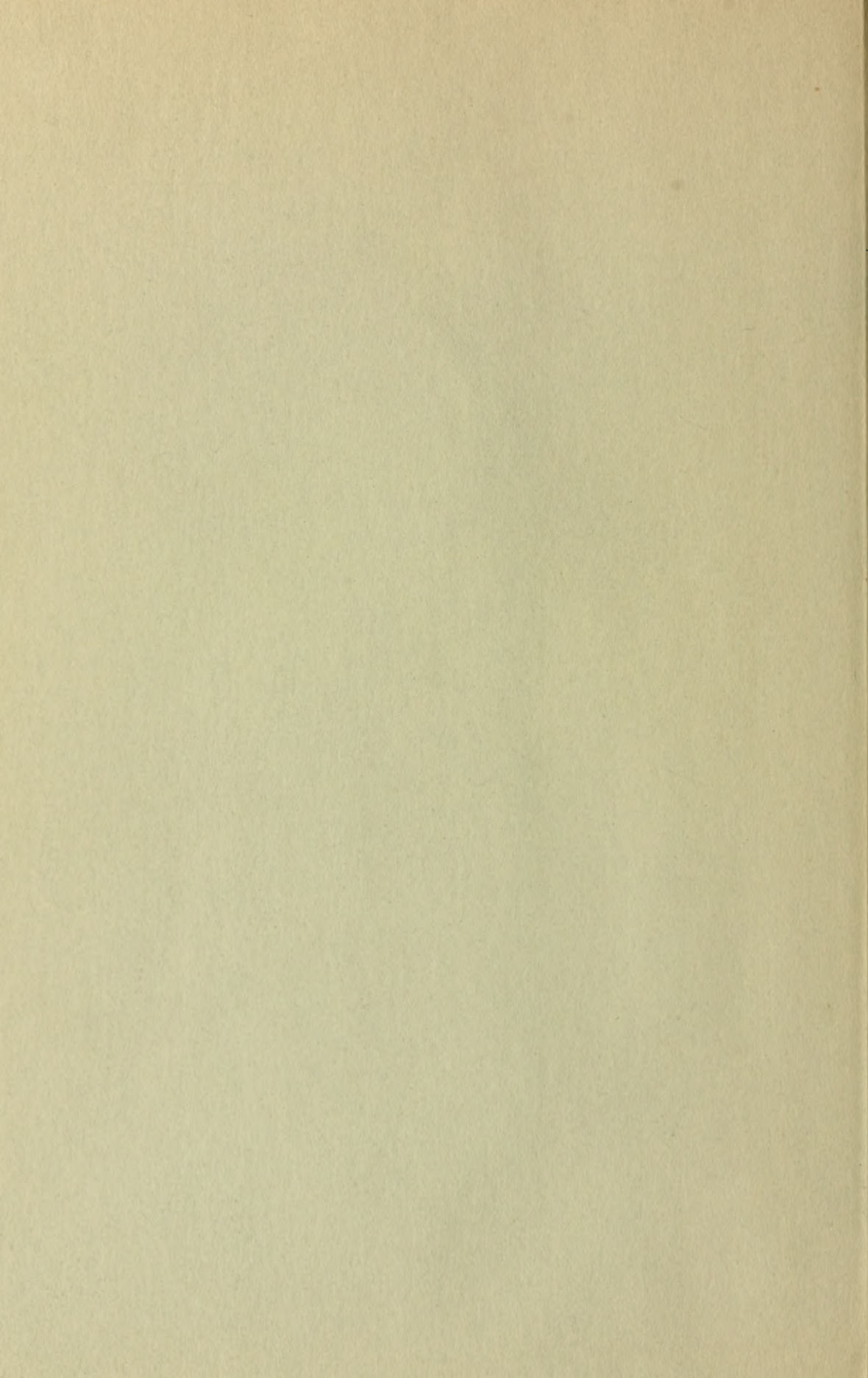
- Fig. 61. The animal seen from the side. ($^{11}/_1$).
 62. One of the first pair of antennæ. ($^{35}/_1$).
 63. » » » second » » » ($^{35}/_1$).
 64. » » » first » » pereopoda. ($^{35}/_1$).
 65. » » » second » » » ($^{35}/_1$).
 66. » » » fourth » » » ($^{35}/_1$).
 67. The urus. ($^{40}/_1$).











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